

A NEW NORTH AMERICAN SPECIES OF FRESH-WATER TUBIFICIDAE (OLIGOCHAETA)

Michael S. Loden

Abstract.—Sexually mature specimens of *Tubifex harmani* n. sp. were collected from Louisiana, although immature forms apparently of this species have been recorded from Indiana, Florida, and British Columbia. The male genital system shows affinities to *Tubifex*, *Isochaeta*, and *Ilyodrilus*. Asexual reproduction by fragmentation is characteristic.

Specimens of a previously undescribed tubificid, *Tubifex harmani* n. sp., were collected from among the roots of *Colocasia antiquorum* (L.) Schott (Fam. Araceae) from a lake adjacent to the Baton Rouge campus of the Louisiana State University. The particulars of the male reproductive tract, determined from stained, whole-mount specimens, show affinities to the genera *Tubifex* Lamarck, *Isochaeta* Pointner, and *Ilyodrilus* Eisen.

Tubifex harmani new species

Fig. 1A-E

Material examined.—HOLOTYPE: NMNH 56184, Louisiana: East Baton Rouge Parish; east side of University Lake, Baton Rouge; 19 October 1976; M. S. Loden. PARATYPES: NMNH 56185, same locality and date, 4 specimens; LSU 2051, same locality and date, 3 specimens. ADDITIONAL SPECIMENS: Florida: Jefferson Co., ditch along US 98, 0.5 mi E Wakulla Co. line, 8 March 1978, W. J. Harman and M. S. Loden. LSU 2052, 1 specimen. Indiana: Gibson Co., Public Service Indiana Pump Storage Reservoir, 3 April 1975, LSU 2053, 2 specimens. British Columbia: Victoria, Victoria Airport, 5 May 1976, R. O. Brinkhurst Collection, 4 specimens.

Etymology.—Named in honor of Professor Walter J. Harman of Louisiana State University.

Description.—Length 10–30 mm (preserved). 50–95 segments. Diameter 0.2 mm at segment XI, 0.15 mm at posterior end. Prostomium rounded to triangular, as long as width at peristomial junction. Clitellum between intersegmental grooves 9/10 and 12/13. Anterior dorsal setal bundles containing 1–3 (usually 2) hair setae and 2–3 pectinate crotchet setae. Hairs very finely serrated, up to 500 μm long. Pectinate setae 63–91 μm long, 3 μm diameter; lateral teeth subequal, distal thinner; 1–4 fine intermediate teeth. Dorsal bundles in clitellar and immediately postclitellar segments with 1–2 (usually 1) hairs up to 425 μm long, and 2 crotchets 70–85 μm long, 4–4.5

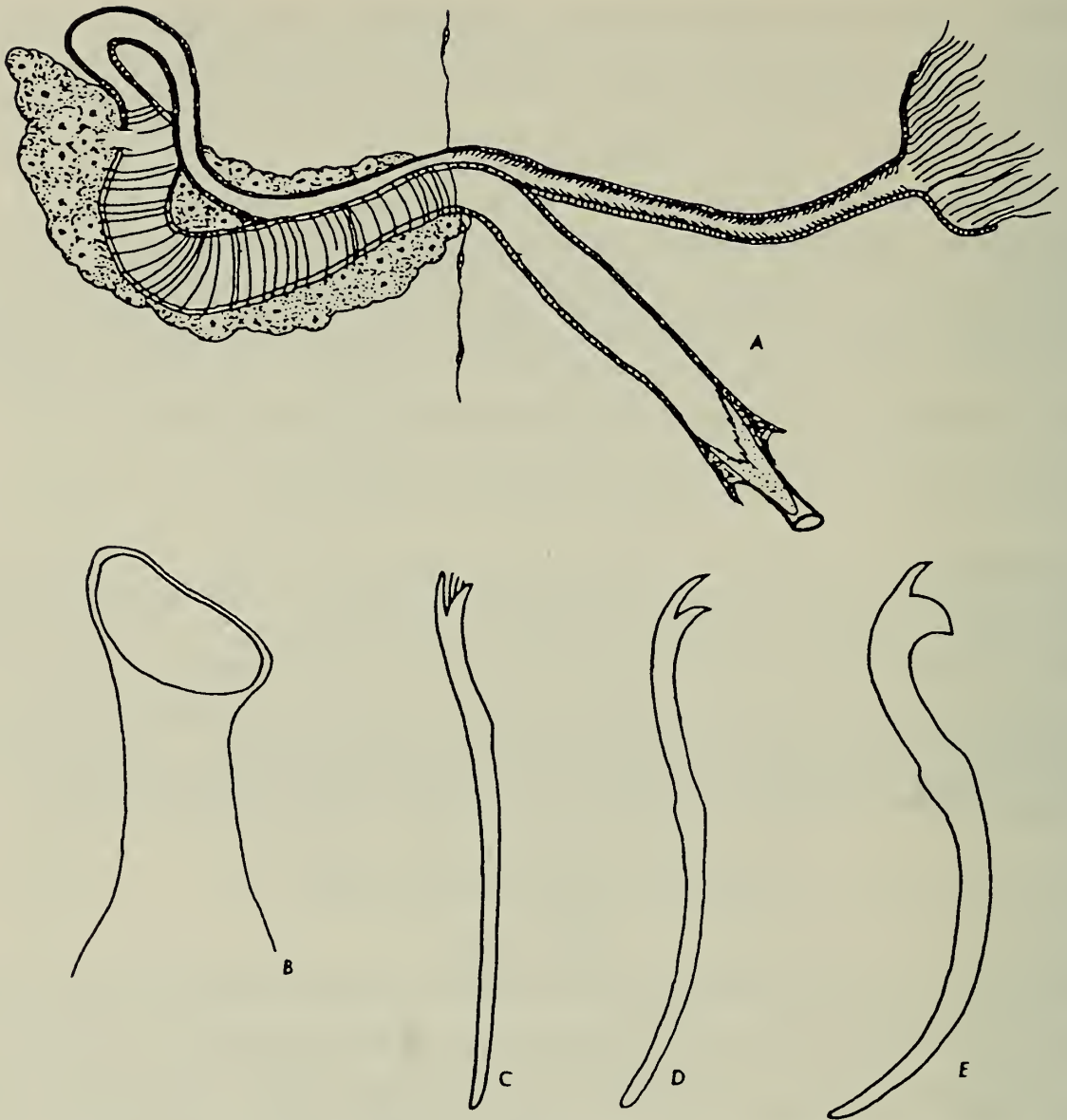


Fig. 1. *Tubifex harmani* A, Male duct; B, Penis sheath; C, Pectinate seta; D, Anterior ventral seta; E, Posterior crotchet seta. Based on *Zeichentubus* drawings of stained, whole-mount specimens.

μm thick; distal tooth thinner and straighter, proximal tooth slightly recurved, occasionally with one thin intermediate tooth. Posterior dorsal bundles with 1–2 hairs, 265–300 μm long, and 1–2 bifid crotchets; crotchets strongly sigmoid, 70–90 μm long, 9–12 μm thick distally; distal tooth shorter and thinner than stout, recurved proximal; nodulus distal. Anterior ventral setal bifid, 3–5 per bundle; in II 49–58 μm long, up to 10 μm thick, distal tooth longer and thinner, nodulus median. In III–X ventrals 60–81 μm long, up to 10 μm thick; teeth subequal to distal slightly shorter; distal tooth thinner. Posterior ventrals resemble posterior dorsal crotchets, occasionally slightly longer and thinner.

Male genital system with all structures paired. Slightly conical male fun-

nels ca. 90 μm maximum diameter on septum 10/11. Vasa deferentia approximately 600 μm long, 25 μm diameter, ciliated anteriorly from septum 11/12. Atria in XIII, 380 μm long, 30–58 μm wide, surrounded by muscle fibers; joined subapically and posteriorly by compact prostate glands, 420 μm long, 120 μm maximum width. Ejaculatory ducts in XI, 250 μm long, 30–53 μm wide, transitioning into penes. Thin cuticular penis sheath 58 μm long, basal diameter 20 μm ; head at an angle, oval, maximum diameter 28 μm . Male pores ventrolateral in XI, in transverse setal plane, just lateral to the setal bundles.

Spermathecae paired in segment X. Ampullae ovoid, 163 μm long, 117 μm wide; duct 35 μm diameter, 200 μm long. Spermatozeugmata ca. 120 μm long, widened at one end; diameter 51 μm at wide end, 23 μm at narrow end; axial cavity 9–25 μm diameter. Spermathecal pores ventrolateral in X, in transverse setal plane, just lateral to the setal bundles. No modified genital setae.

Asexual reproduction by fragmentation, 10 segments formed anteriorly.

Discussion.—The uniqueness of this species in the Tubificinae is based on the morphology of the setae, the male genitalia, and on evidence of asexual reproduction. The posterior setae resemble those of several species of the *Peloscolex* complex and *Psammoryctides*, but the configuration of the male ducts precludes conspecificity of *T. harmani* with any in those genera.

Suggestions of asexual reproduction first came from the discovery of several specimens that showed anterior regeneration from segments with setae characteristic of the posterior third of the body; the crotchet setae of segment XI were of the strongly sigmoid type. In one individual the periproct was separated from the zone of anterior regeneration by only 35 segments. The suggestions of asexual reproduction were reinforced when specimens in cultures were severed approximately one-third of the body distance from the anterior (ca. segment XXX). Both anterior and posterior portions developed into complete worms in all cases, thus the regenerative capacity of the species is great. Two worms autotomized and regenerated spontaneously.

The type-locality was sampled systematically for 18 months, and occasionally for an additional 12 months; of well over 300 specimens collected, only three individuals were sexually mature. Asexual reproduction, therefore, appears to be a primary mode of propagation. No sexual maturity was observed in a population of a species of *Bothrioneurum* at the same location; this genus has species that characteristically reproduce asexually (Brinkhurst, 1971).

Although sexually mature worms are known only from the type-locality, immature specimens possessing setae virtually identical to those described for *T. harmani* have been collected from Florida, Indiana, and British Columbia; these specimens have been identified tentatively as *T. harmani*.

Tubifex harmani presents features that may cause it to be placed by some

investigators in *Isochaeta* (*sensu* Brinkhurst, 1963) or *Ilyodrilus*. Brinkhurst stated in his definitions that *Isochaeta* "has elongate, narrow atria scarcely distinguishable from vasa deferentia"; *Tubifex* was defined as having "vasa deferentia at least as long as the pear-shaped to cylindrical atria which are frequently turned over apically, otherwise standing vertically in XI; no distinct ejaculatory ducts; prostate glands large, closely connected to the atria subapically on anterior side." *Ilyodrilus*, in turn, has "large prostate glands on the upper posterior walls, ejaculatory ducts separated from atria, but broad."

The atria of *T. harmani* are elongate and rather narrow; the prostate connections are subapical and posterior. Only the presence of muscle fibers distinguishes atria from ejaculatory ducts. The vasa deferentia are conspicuous by their reduced diameter, and they are ciliated in the proximal portion. Thus, characters of each genus are present, but *Tubifex* and *Isochaeta* appear to have more in common with the new species.

The genus *Isochaeta* was erected by Pointner (1911) for *I. virulenta*. The type-material was examined by Brinkhurst (1963), who supported Pointner's views on the validity of the species. The types were also examined by Hrabě (1966), who agreed with Michaelsen (1926) that *I. virulenta* was based on specimens that were, in actuality, incompletely mature individuals of a *Limnodrilus* species, probably *L. udekemianus* Claparède. Hrabě therefore concluded that not only was the species invalid, but that the genus was a junior synonym of *Limnodrilus*.

Brinkhurst (1963, 1971) included species with and without hair setae in both *Isochaeta* and *Tubifex*. Hrabě (1966, 1967) placed in *Tubifex* only species with hair setae (except some subspecies of *T. tubifex*); he created the genus *Isochaetides* for accommodating similar species that lack hair setae. Thus, there is the situation where two of the leading authorities in the field differ in opinion not only on the validity of the genera, but on the relative importance of the details of the genitalia and setal configurations.

If Hrabě's interpretation of tubificine genera is accepted, *T. harmani* clearly would fall into *Tubifex*. With Brinkhurst's interpretation, the species could be placed into either *Tubifex* or *Isochaeta*, depending upon the relative weights ascribed to the various genital characters.

Dr. R. O. Brinkhurst (pers. com.) agreed with the uncertainty of the generic placement of *T. harmani*, but he was more favorably disposed toward *Isochaeta*. With all due respect to Dr. Brinkhurst, I have elected to place the new species in *Tubifex* due to:

1. the large prostate being more typical of *Tubifex*.
2. the vasa deferentia being clearly distinguishable from the atria.
3. the ability to distinguish the atrium from the ejaculatory duct only by the presence of atrial muscle fibers.

4. the ease of relegating the species to Hrabě's (1966) definition of *Tubifex*.
5. my subjectivity in assigning the species to the older genus while there is uncertainty in the generic placement.

Species of *Isochaeta* and *Tubifex* (*sensu* Brinkhurst, 1963, 1971) that share with *T. harmani* the presence of hair setae and a well-defined penis sheath, and an absence of genital setae include *I. nevadana* Brinkhurst, *I. israelis* Brinkhurst, *T. ignotus* (Stolč), *T. montanus* Kowalewski, *T. kessleri* Hrabě, and *T. nerthus* Michaelsen. In addition to differing from *T. harmani* in the configurations of the male ducts, none of those species have the enlarged bifid setae in the posterior dorsal and ventral bundles.

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Department of Zoology, Louisiana State University, Baton Rouge, Louisiana 70803.